

Optimisation del ancho de banda (Introduction to Linux)



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Presentaciones

Introduction to Linux

- This is NOT:
 - A workshop on Linux/Unix system/network administration
 - A workshop on network security
 - an advanced workshop on BMO.
- This is:
 - A day dedicated to reviewing basic Linux/Unix concepts in order to be able to focus on BMO the next days (since we will work with Linux systems the all time).

Program

- Linux Distributions
- Installation process
- Documentation
- Users/Groups
- Filesystem/s
- Package management
- Kernel and Modules
- Log files
- *Automating tasks*
- *System services*
- *Run levels*
- *DNS Basics and config*
- *Basic host net cfg*
-

Programme

- **Linux Distributions**
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Linux Distributions



(See http://en.wikipedia.org/wiki/Linux_distribution)

Linux Distributions

- Graphical interface/s
- Easiness of use
- Kernel version (vanilla + enhancements)
- Application types (security, Virtual Machines, ...)
- Standard and/or Live
- Free and/or Commercial

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Installation process

- Media Source (CD, DVD, ISO image, NET)
- Disk Partitioning
- Window Manager/s and Applications
- User/App/System Configuration

Installation process

(partitioning)

- Automatic vs Manual partitioning
- Factors to take into account:
 - Dual / multiboot system
 - HD / RAM upgrade
 - OS vs DATA
 - Encryption
 - Volumes / RAID
- Special directories / partitions:
 - */boot*
 - [SWAP]
 - */var/log*
 - */home*
 - ...

Installation process

(Window Manager/s and Applications)



KDE

(<http://www.kde.org>)



GNOME

(<http://www.gnome.org>)



ENLIGHTMENT

<http://www.enlightenment.org>

....

(Do not confuse the Windows managers
with the Window manager's themes)

Fedora Core 10 Installation

- Please use the following configuration:
 - Root password: umsa123
 - User name/password: umsa/umsa
 - Hostname: PCXY where X/Y are Row/Column
 - Partitions ...

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Documentation

- Command line documentation: *man/info* commands
- Basic kernel doc in directory
 - *<kernel_source>/DOCUMENTATION*
- Homepage of the Linux distribution
 - For example, Fedora doc available here:
<http://docs.fedoraproject.org/>
- The Linux Documentation Project:
 - <http://tldp.org>
- Free online books (made legally available by the authors / publishers)
- and Google

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Users / Groups

- Creating/Deleting/Administering users
 - How would you guess what the commands to add/del users/groups could be?
- Login Passwords
 - How would you guess what the commands to change user login passwords could be?
- File permissions/ownerships
 - “suid” commands

User / Groups

- *useradd*
- *userdel*
- *usermod*
- *userpasswd* (graphical interface)
- *users* (use “w” instead)

Use the *man* command to get a description and the usage syntax.

Key files in */etc*

- */etc/passwd*
- */etc/shadow*

- */etc/groups*
- */etc/gshadow* (we won't look at this)

Syntax of */etc/passwd* lines

| Username | X (pass) | User ID | (Primary) GroupID | Comment | Home Dir | Shell |
|----------|-------------|---------|----------------------|---------|----------|-------|
|----------|-------------|---------|----------------------|---------|----------|-------|

Examples:

```
root:      x:      0:      0:      root:      /root:      /bin/bash
benve:     x:      500:    500:    CB:        /home/benve: /bin/bash
apache:    x:      48:     48:     Apache:    /var/www:    /sbin/nologin
```

Syntax of */etc/shadow* lines

| Username | Encrypted password | Last paswd change | Minimum | Maximum | Warning | Inactive | Expire |
|----------|-----------------------|----------------------|---------|---------|---------|----------|--------|
|----------|-----------------------|----------------------|---------|---------|---------|----------|--------|

Examples:

```
root:      $6$x...:    14211:    0:      99999:    7:      :      :
benve:     $6$h...:    14212:    0:      99999:    7:      :      :
apache:    !!:        14211:    0:      99999:    7:      :      :
```

Syntax of */etc/group* lines

| Group name | X (pass) | Group ID | Group members |
|------------|-------------|----------|------------------|
|------------|-------------|----------|------------------|

Examples:

```
root:x:0:root
benve:x:500:
apache:x:48:
```

Exercise 1

- Using the command line:
 - create the two new users ***user_test1*** and ***user_test2***
 - delete the user ***user_test2***
- Verify the configuration (how??? su)

Exercise 2

- Using the command line:
 - create the two new groups ***grp_test1*** and ***grp_test2***
 - add user ***user_test1*** to group ***gpr_test1***
 - Change user ***user_test1***'s password to *1234abcd*
- Verify the configuration (how???)

Exercise 3

- What is the Fedora GUI for managing users/groups?
- Using the Fedora GUI:
 - create the new user ***user_test3***
 - add user ***user_test3*** to group ***grp_test2***
 - Create the new group ***grp_test3***
 - Add user ***user_test3*** to group ***grp_test3*** too
 - Change user ***user_test3***'s password to ***abcd1234***
- Verify the configuration (how???)

File ownerships

- Each file/directory has:
 - Owner user
 - Owner group
- Changing ownerships
 - Command ***chgrp***
 - Command ***chown***

Exercise 4

- Log in as user *umsa*.
- Create an empty file *test_file.txt* in your home directory
- Check its user/group owners
- Change them (using chmod) to *root/root*
- Change them (using chmod) to *user_test3/grp_test1*

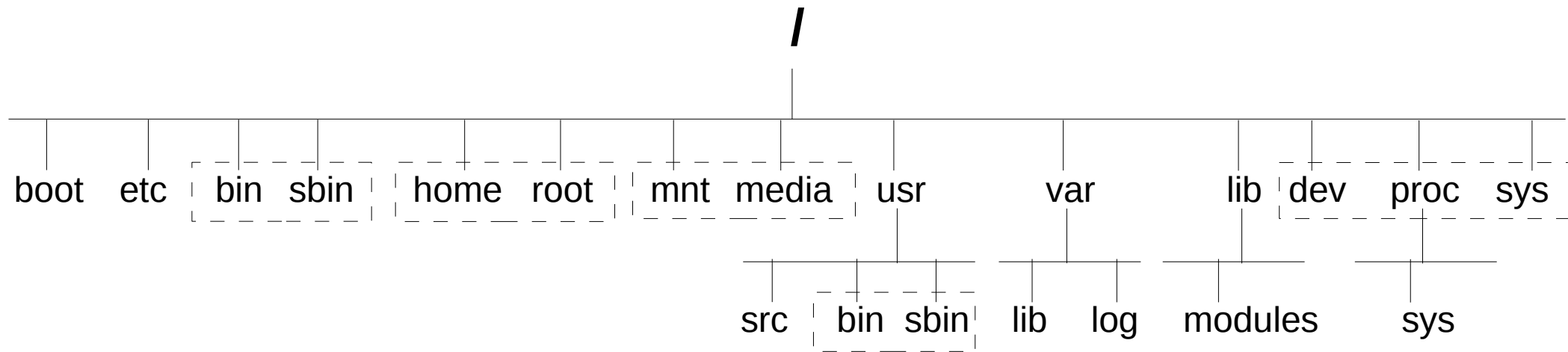
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Filesystems

- Default filesystem tree
- Filesystem types
 - Special/Virtual filesystems
- Creating filesystems

Default filesystem tree



(I have omitted a few directories for simplicity)

Filesystem types

- VFAT / NTFS (Windows compatibility)
- ext2 / **ext3** / ext4
- SWAP
- ...

- Differences
 - Native OS
 - Simple or with support for Journaling
 - Local or network(let's ignore this type for now)

Virtual Filesystems

- /proc
- **/proc/sys**
- /sys
- /dev
- ...

Creating Filesystems

- /sbin/
 - mkfs
 - mkfs.vfat
 - mkfs.ntfs
 - mkfs.ext2
 - mkfs.ext3
 - mkfs.ext4
 - mkswap
 - ...

Example - Create an ext3 filesystem on the (already existent) partition /dev/sda5: ***mkfs.ext3 /dev/sda5***

Creating Filesystems

- You do not create a filesystem on a directory
- You create it on:
 - a partition, or
 - an entire HD, or
 - a Volume, or
 - a file (that you will mount with the *loop* option)
 - ... etc

Checking the integrity of a filesystem

- /sbin/
 - fsck
 - fsck.vfat
 - fsck.ntfs
 - fsck.ext2
 - fsck.ext3
 - fsck.ext4
 - ...

Example – Check the integrity of the ext3 filesystem on the (already existent) partition /dev/sda5: ***fsck.ext3 /dev/sda5***

Mounting a Filesystem

(*mount* command)

- Simplified syntax (see *man* for the complete syntax)
 - *mount [-t vfstype] [-o options] device dir*
- Examples
 - `mount -t ext3 /dev/hda2 /home`
 - `mount -t vfat /dev/hda3 /DATA_WIN`

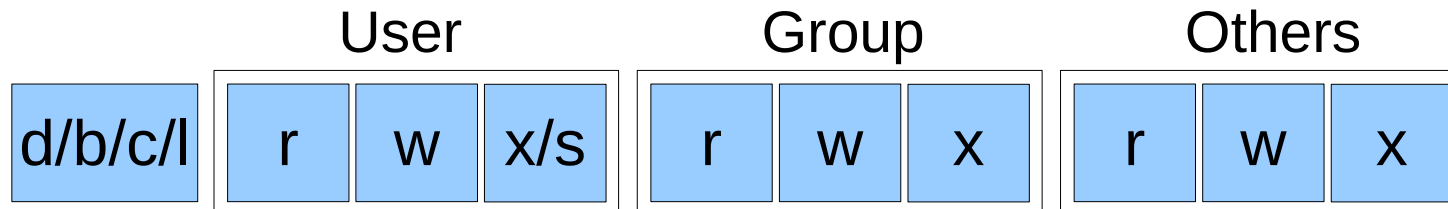
Exercise 5

- Use the *mount* command to see what/where filesystems your system has mounted (do not get scared!)
- See what additional information the command *df* provides

Exercise 6

- Create a new partition of 1GB
 - If you do not know how to use the *fdisk* command, PLEASE ask!
- Create an ext3 filesystem on it
- Mount the new partition under */mnt/TEST* (*)
- The mount command does not make changes permanent. How would you make the config (*) permanent?

Permissions



Examples

| | | | | | | | |
|------------------------|---|-----|-----|-----|------|------|----------------------|
| /bin/l | - | rwX | r-X | r-X | root | root | |
| /etc | d | rwX | r-X | r-X | root | root | |
| /usr/bin/passwd | - | rws | r-X | r-X | root | root | |
| /dev/sda1 | b | rw- | rw- | --- | root | disk | |
| /dev/tty0 | c | rw- | -w- | --- | root | root | |
| /sbin/mkfs.msdo | l | rwX | rwX | rwX | root | root | mkfs.msdo -> mkdosfs |

Changing Permissions

(*chmod* command)

- You can add/remove/set permissions
- Simplified syntax (see *man* for the complete syntax)
 - *chmod [-R] [ugoa] [-+=] file/directory_name*
- Examples
 - *chmod ugo=rx test.txt*
 - *chmod go-w doc.txt*
 - *chmod go+r foto.jpg*
 - *chmod -R ugo+rwx /shared_dir/*

Exercise 7

- Login as user *umsa*
- Create a text file named **arbol.txt**
- Check its default permissions
- Would it make sense to add the X permission for the owner (ie user *umsa*)?
- And for the other users?
- Remove the R permission for “Others”.
 - Verify it
- Remove the W permission for the people in the same group as user *umsa*.
 - Verify it

Exercise 8

- Log in as user *umsa*
- Create the text file **lssl**
- Check its permissions
- What result do you get if you type these commands?
 - **ls** <TAB> <TAB>
 - **./ls** <TAB> <TAB>
- Add the X permission to **lssl** for the user *umsa*
- Now what results do you get if you type the above two commands?

Links

(*ln* command)

- Hard VS Symbolic
 - Hard links cannot cross file system boundaries
- Simplified syntax (see *man* for the complete syntax)
 - *ln [-s] TARGET LINK_NAME*
- Examples
 - *ln /data/foto/sol.jpg foto_sol.jpg*
 - *ln -s /FOTOS/sol.jpg /home/umsa/Desktop/foto_sol.jpg*

Exercise 9

- Login as *root*
- In the *root*'s home directory create a hard link to **/bin/lS** named **mio_lS**
- Login as user *umsa*
- In the *umsa*'s home directory create a hard link to **/bin/lS** named **mio_lS**
- In the *umsa*'s home directory create a symbolic link to **/bin/lS** named **mio_lS**

Searching the Filesystem

- *find vs locate*
- *Examples*
 - *find /etc -name httpd**
 - *find /proc/sys -name ip_forward*
 - *locate httpd.conf*
 - *locate sch_htb*

Exercise 10

- Using the *man* command, find the syntax of the commands *find* and *locate*
- Now using the above commands determine:
 - The location of the file `xinetd.conf`
 - The location of the file `ip_forward.c`
- Answer the following questions (you can use the *man* command to get some help):
 - Which one between the two is faster?
 - Which one between the two is more reliable?

Exercise 11

- Login as user *umsa*
- Create the file **abcd_1234** in the directory */tmp*
- Supposing you did not know where such file was, search it using *find* and *locate*. What results did you get?
- Now run the command *updatedb*
- Do *find* and *locate* return the same results now?

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Package Management

- Distribution specific
 - Different distributions provide different mechanisms for
 - Installing applications
 - Downloading updates
 - Etc
- Tarball/CompressedTarball (.tar, .tar.gz, .tar.bz2,)
 - Can be used with any Linux distribution, but ...

Package Management

- Since we are using **Fedora Core 10** in the lab, we will look at:
 - *rpm*
 - *yum / yumex*
 - (You can also use the apt/synaptic interface of Debian if like, but we won't look at this today. See package “apt”)
- ... but also at tarball archives.

Package Management (rpm)

- Install a package (without taking care of dependencies)
 - *rpm -i <package_name>*
- Check whether a package is installed
 - *rpm -qi <package_name>*
- Get the list of files in a given package
 - *rpm -ql <package_name>*
- Get the package a given file belongs to.
 - *rpm -qf <file_name>*
- ...

Exercise 12

- Check whether the package **iptables** is installed on the system
 - If it is installed, what version is it? When was it released?
- Determine, using the *rpm* command, what files belong to this package.

Exercise 13

- Check whether the package **yumex** is installed on the system
- Download the package **yumex** (or get it from the Fedora Core 10 DVD you have used for the installation)
- Install it with the *rpm* command
- Determine, using the *rpm* command, what its configuration files are.

Exercise 14

- Determine what package the file **passwd** that is in the directory */etc* belongs too.
- Determine what package the file **/etc/resolv.conf** belongs too.
- Determine what configuration files are used by the **httpd** web server.

Basic packages management (yum)

- Install a package (taking care of dependencies)
 - *yum **install** <package_name>*
- Check dependencies for a package
 - *yum **deplist** <package_name>*
 - (ex *yum deplist cacti*)
- Search for packages matching a given string
 - *yum **search** <string>*
- ...

Exercise 15

- Check whether the package **yumex** is already installed on the system
- Install it with the *yum* command if necessary
- Use **yumex** to install one package from the group *Applications*

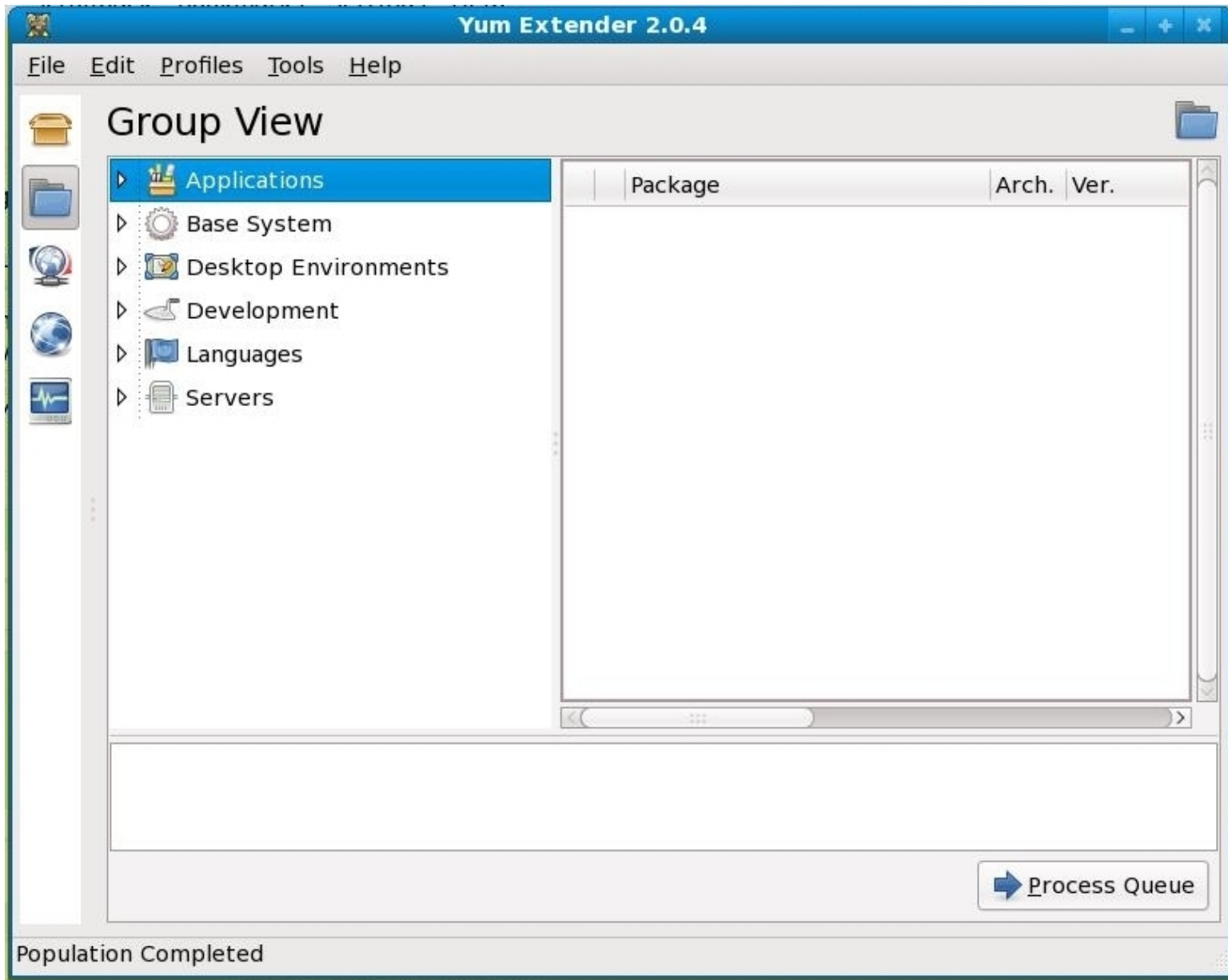
Package Management (Repositories)

- The tools (like **yum**) that use the network to download applications/updates, connect to servers referred to as repositories.
- Depending on how you installed your system, by default your Fedora Core 10 system may be using only a couple of default repositories, but you can add others.

Exercise 16

- Using the *man* command, determine the *yum* option that tells you what repositories *yum* is configured to use.
- Using the *rpm* command, determine what the configuration files of *yum* are, and find the piece of configuration that tells *yum* to use the repositories returned by the previous command.
- **OPTIONAL EXERCISE:**
 - Add new repositories
(for example <http://rpm.livna.org/>)

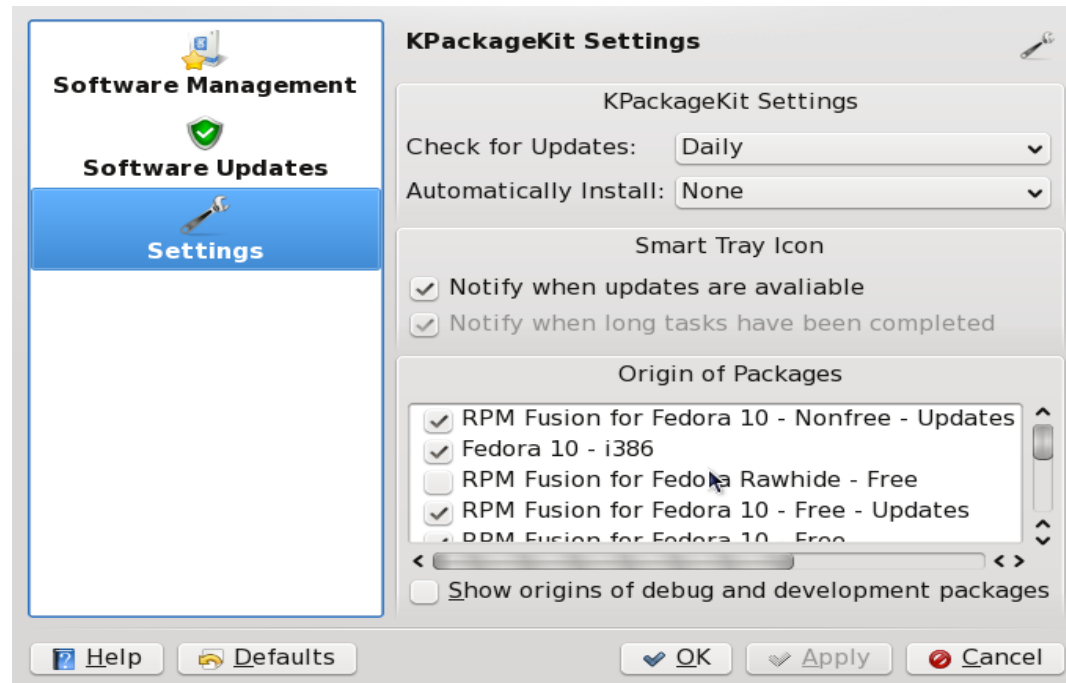
Package management (YumEx - ie, Yum Extender)



```
yum install yumex
```

Package Management (PackageKit)

- Another GUI for managing packages
- See <http://www.proyectofedora.org/wiki/index.php/PackageKit>
- It is ON by default on Fedora Core 10.
 - EXERCISE: try to disable it.



Program

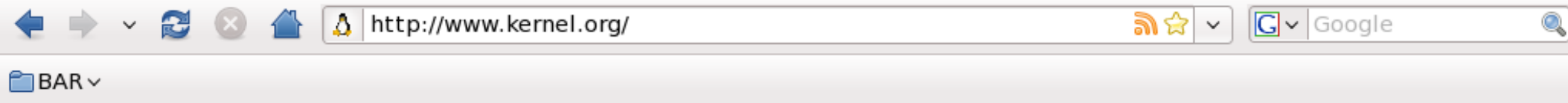
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Kernel

- How/Where to download it
- Versioning scheme
- Source Code
- Configuration
- Compilation
- Installation
- Managing modules

Downloading

(<http://www.kernel.org>)



The Linux Kernel Archives

Welcome to the Linux Kernel Archives. This is the primary site for the Linux kernel source, but it has much more than just Linux kernels. [Frequently Asked Questions](#)

| Protocol | Location |
|---|---|
| HTTP | http://www.kernel.org/pub/ |
| FTP | ftp://ftp.kernel.org/pub/ |
| RSYNC | rsync://rsync.kernel.org/pub/ |

| | | | |
|--|---------------------------------|----------------------|--|
| The latest stable version of the Linux kernel is: | 2.6.29.2 | 2009-04-27 17:39 UTC | F V VI C Changelog |
| The latest prepatch for the stable Linux kernel tree is: | 2.6.30-rc4 | 2009-04-30 05:13 UTC | B V VI C Changelog |
| The latest snapshot for the stable Linux kernel tree is: | 2.6.30-rc4-git1 | 2009-05-03 00:01 UTC | B V C |
| The latest 2.4 version of the Linux kernel is: | 2.4.37.1 | 2009-04-19 18:45 UTC | F V C Changelog |
| The latest 2.2 version of the Linux kernel is: | 2.2.26 | 2004-02-25 00:28 UTC | F V Changelog |
| The latest prepatch for the 2.2 Linux kernel tree is: | 2.2.27-rc2 | 2005-01-12 23:55 UTC | B V VI Changelog |
| The latest -mm patch to the stable Linux kernels is: | 2.6.28-rc2-mm1 | 2008-10-29 06:29 UTC | V |

F = full source, **B** = patch baseline, **V** = view patch, **VI** = view incremental, **C** = current [changesets](#)
Changelogs are provided by the kernel authors directly. Please don't write the webmaster about them.
[Customize the patch viewer](#)

Installation

How many of you are (or used to be) **programmers**?

Installation

- Decompress it under */usr/src*
- Configure it with one of the following commands (there are many more):
 - ***make xconfig***
 - *make menuconfig*
- Compile the image
 - ***make***
- Compile the modules
 - ***make modules***
- *Install the modules*
 - ***make modules_install***
- Install the kernel image (ie, update bootloader)
 - ***make install***

Kernel

(Modules)

- The package used to administer modules is *module-init-tools* (use the *rpm* command to determine what its config files are)
- The modules for the X.Y.Z.K kernel version are located at:
 - `/lib/modules/X.Y.Z.K/`
- Useful commands:
 - `lsmod`
 - `insmod`
 - `modprobe`

Kernel

(Documentation)

- *Directory /Documentation*
- BOOK: *Linux kernel in a Nutshell*, O'Reilly, by Greg Kroah-Hartman
 - This book is also freely downloadable in PDF format here: <http://www.kroah.com/lkn/>

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Automating tasks

- cronic
 - “system” service cron
- anacron
- crontabs

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System Services & Run Levels

- Run Levels: 0 1 2 3 4 5 6



- *Sservice_name* vs *Kservice_name*

System Services & Run Levels

- init
- chkconfig
- System --> Administracion --> Services

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DNS Basic

- We will look at the theory when reviewing the networking basics.
- The DHCP server usually provides the info necessary to configure the local `/etc/resolv.conf` file.
 - `/etc/resolv.conf`
 - `/etc/hosts`
 - `(/etc/hosts.conf)`

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- ***Basic host net cfg***

Basic host net cfg

- Config files and scripts
 - ifup/ifdown
 - /etc/sysconfig/
 - + /etc/resolv.conf /etc/hosts ...
- System-config-network
 - MENU: System / Administration / Network
- NetworkManager
 - How to enable/disable it?

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